NATIONAL INSTITUTES OF HEALTH
WARREN GRANT MAGNUSON CLINICAL CENTER
NURSING DEPARTMENT

PROCEDURE: Intra-Aortic Balloon Pump Insertion

Approved:

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Implemented: 2/02

I. ESSENTIAL INFORMATION:

Intra-aortic balloon pump (IABP) therapy or counterpulsation is short term treatment designed to increase coronary perfusion, increase systemic perfusion and decrease myocardial workload and afterload.. The IAPB inflates and deflates in concert with the mechanical cardiac cycle.
The physician inserting the IAPB must be aware of adverse effects associated with percutaneous sheath introduction including: bleeding at insertion site, limb ischemia, vessel trauma and thrombosis.
The IAPB catheter should not remain inactive ie (not inflating or deflating) for more than 30 minutes due to potential for thrombus formation.

II. A. EQUIPMENT

1. Shave/prep kit
2. Betadine prep solution
3. ECG electrode pads
4. Xylocaine 1% or 2%
5. Sterile gowns, gloves, drapes and towels
6. Masks, caps
7. Scalpel blade
8. Sterile 4x4 pads, basins, snap covers
9. Syringes, 4- 20cc, 4 -10cc, 4 -5cc
10. Suture material
11. Transparent sterile dressing (2)
12. Isovue 370 contrast dye, 100cc bottle (check for dye allergies)
13. Heparinized flush system for arterial pressure line
14. IABP Datascope console, plugged in ready for use
15. Datascope IABP Catheter - 40cc Balloon for adults >5'3" or
    34cc Balloon Catheter for smaller adults <5'3"
16. Datascope wire 0.020 (back-up if needed)
17. IV Sedation per MD order
18. Heparin flush bag, Heparin vial, and Heparin Drip (if ordered by M.D.)

B. STEPS	KEY POINTS
1. Explain procedure to patient and family. Have MD obtain written consent.	To allay anxieties and answer questions. Verbal consent under emergency conditions
2. Obtain baseline lab studies:12 lead EKG,CBC, Platelet Ct., PT, PTT, Electrolytes,and BUN, Creatinine and Type and Cross.	Hematologic studies are essential since Heparin is administered during insertion platelet reduction may occur during pumping. Electrolytes, BUN and Creatinine help evaluate effectiveness of IABP.

3. Have patient transferred to unit where IABP insertion will occur. Prepare equipment and have Fluroscopy available.	Insertion may occur at bedside, 10D, OR, or Cardiac Cath Lab.
4. Administer oxygen as ordered. Monitor oxygen saturation.	
5. Insert foley catheter. Do not tape to leg as either leg may be used for insertion.	Urine output is an indicator of cardiac output. Foley must be patent and draining to prevent over-inflation or rupture of the bladder.
6. Record baseline vital signs, temp. HR, rhythm, BP and respiratory rate.	To evaluate effectiveness of IABP.
7. Locate and mark pedal pulses/posterior tibial pulses bilaterally. Note color and temperature of each leg.	To evaluate any pre-existing vascular problems and monitor distal blood flow to extremities.
8. Place IABP console at foot of bed and attach ECG electrodes from patient to ECG cable of IABP.	
9. Prepare pressure tubing set with heparinized saline bag.	Balloon timing is adjusted utilizing the arterial pressure tracing.
10. Have personnel who is responsible for IABP console begin initial set-up while patient is being prepared.	

The initial set-up of Datascope's IABP console according to their "Abbreviated Operator's Guide" is as follows:

A. Establish power, verify Mains Power Switch and IABP On/Off Switch are On.
B. Open Helium tank and verify Helium pressure.
C. Establish ECG and pressure connections from patient.
D. Zero Transducer.
   1. Open transducer to air
   2. Press the Zero Pressure key for 2 seconds
   3. Close the transducer
E. Confirm Initial Pump Settings: Defaults =
   1. Trigger Select: ECG
   2. IAB Frequency: 1:1
   3. IAB Inflation: Midpoint
   4. IABP Deflation: Midpoint

5. Slow Gas Alarm: On
6. IAB Fill: Auto
7. IAB Timing- Auto-R Trac On
8. ECG Gain –Normal

F. Set Initial Timing . Adjust IAB Inflation and Deflation slide controls to position the inflation interval of the arterial waveform to begin at the dicrotic notch and end before the systolic upstroke

STEPS	**KEY POINTS**
11. Shave and prep groin from 3 inches above groin to above knee with Betadine	MD will determine if both groins need to prepped.
12. Sedate patient according to MD orders	Anxiety must be minimized as patient cooperation is needed.
13. Mask, cap and gown all staff in the immediate area. and prepare sterile operative field. Drape patient.	To maintain a sterile field.
Cover lights and fluoroscopy machine with sterile snap covers. If Fluroscopy is used, those within the sterile field must wear lead aprons.	Whenever possible, use Fluoroscopy during IAB insertion to ensure proper placement of IAB catheter in Descending Thoracic Aorta with the IAB catheter tip just distal (approximately 2cm) to the left subclavian artery.
14. Assist MD with insertion procedure.	
a. Prepare anticoagulant therapy according to MD order.	
b. Have on sterile table, scalpel, syringes, needles 4x4s, towels, basins, suture material, sterile transparent dressings, Xylocaine, Heparin Flush, and IAB catheter.	
c. Carefully remove IAB catheter from the tray pulling STRAIGHT out to avoid difficulty removing it from the tray or to avoid damaging it.	Take care not to kink or place undue force on the IAB catheter.
d. Attach the IAB catheter and appropriate extender to the safety disk	MD will determine if insertion will be with a sheath or sheathless.
e.Apply sterile dressing after sheath is sutured and mark across balloon shaft.	To detect any subsequent balloon migration.

15. Attach the IAB Catheter and Initiate Pumping.

16. Press the Assist/Standby key and observe "Autofilling Message"
17. Once the "Autofilling message clears, pumping begins.
18. Ensure optimal augmentation during diastole by tuning IAB timing
19. Fine tune the timing by adjusting the IAB Inflation and Deflation controls if needed.
20. Verify Augmentation Alarm is approximately 10mmHg less than the patient's diastolic augmentation pressure. Adjust if needed by pressing the Augmentation Alarm and using the arrow keys to change the value displayed on the screen.
21. Datascope provides comprehensive HELP screens with easy to follow step by step instructions as well as all alarm and alert conditions.

22. Monitor vital signs during procedure.

23. A portable chest x-ray will be done once the balloon catheter is inserted if procedure not performed under fluoroscopy.	Necessary to confirm catheter placement.
24. Check timing of balloon by adjusting the highlighted portion of arterial pressure tracing, which occurs when IABP is in standby mode.	To ensure optimum effects of IAB counterpulsation.
25. Press and hold IAB fill button for 1 second- status message will read "auto-filling". When message clears, continue.	See "Abbreviated Operators Guide"
26. Initiate pumping.	
27. If blood is observed within the catheter or catheter extender tubing at any time during IAB procedure, stop pumping and notify MD immediately!	Life-threatening complications such as Aortic Dissection must be ruled out.

C. DOCUMENTATION

1. Record pre, during and post IAB vital signs.

2. Chart assist/unassisted systolic,
diastolic augmentation.
assist/unassisted diastolic pressures.

3. Chart MD inserting catheter, site of catheter insertion, catheter size, groin assessment, patient response, trigger mode, frequency of IABP ratio. Record a strip of the arterial waveform tracing.

4. Refer to IABP SOP (link to SOP) for care of the patient during IABP therapy and documentation guidlelines

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D. REFERENCES

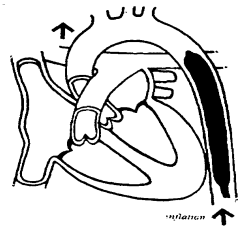
1. Datascope Corporation Clinical Services Department (2000). "Polices and Procedures Related to IABP Therapy". Fairfield, N.J. Datascope Corporation.
2. Datascope Corporation . (2000). "Abbreviated Operator's Guide for the System 98 Intra-Aortic-Balloon Pump". Fairfield, N.J. Datascope Corporation.
3. Kern, Morton, J. (1999). The Cardiac Catherization Handbook . 3rd Edition. St. Louis: Mosby Inc.
4. Quaal, Susan, J. Comprehensive Intra-Aortic Ballon Pumping. (1998). 4th Edition. St. Louis: Mosby Inc.
5. Watson, S. (2000). Invasive Cardiology: A Manual for Cath Lab Personnel. Birmingham, Michigan: Physician Press.

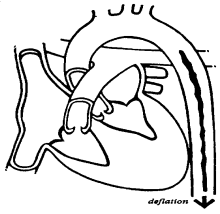
E. APPENDICES

1. Appendix 1

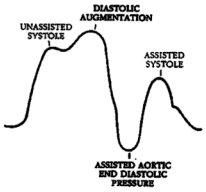
Theory of IABP

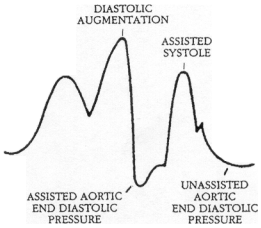
A. Counterpulsation
   1. Balloon Structure and Position
   2. Increased Coronary Perfusion
      a. Inflation
      b. Augmentation of Diastolic Pressure
   3. Decreased Left Ventricular Workload
      a. Deflation
      b. Afterload Reduction
   4. Physiological Pressure Wave Changes
      a. Dicrotic Notch
      b. Diastole: Augmentation
      c. Decreased End-Diastolic Pressure
      d. Systole: Decreased Assisted Systolic Pressure

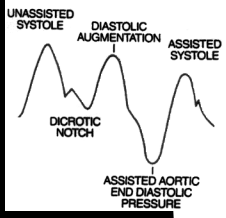


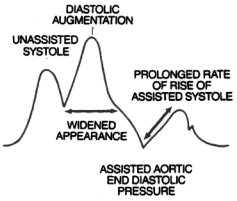


Appendix 2

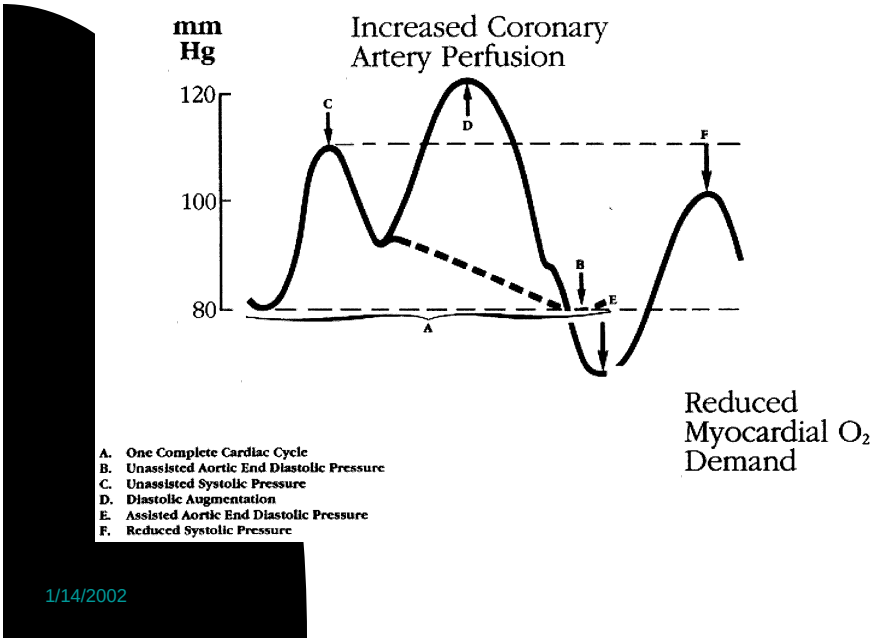

DIASTOLIC AUGMENTATION
UNASSISTED SYSTOLE
ASSISTED SYSTOLE
ASSISTED AORTIC END DIASTOLIC PRESSURE


DIASTOLIC AUGMENTATION
ASSISTED SYSTOLE
ASSISTED AORTIC END DIASTOLIC PRESSURE
UNASSISTED AORTIC END DIASTOLIC PRESSURE


UNASSISTED SYSTOLE
DIASTOLIC AUGMENTATION
ASSISTED SYSTOLE
DICROTIC NOTCH
ASSISTED AORTIC END DIASTOLIC PRESSURE


DIASTOLIC AUGMENTATION
UNASSISTED SYSTOLE
PROLONGED RATE OF RISE OF ASSISTED SYSTOLE
WIDENED APPEARANCE
ASSISTED AORTIC END DIASTOLIC PRESSURE

Appendix 3


mm Hg
120
100
80
C
D
F
B
E
A
Increased Coronary Artery Perfusion
Reduced Myocardial O_2 Demand
A. One Complete Cardiac Cycle
B. Unassisted Aortic End Diastolic Pressure
C. Unassisted Systolic Pressure
D. Diastolic Augmentation
E. Assisted Aortic End Diastolic Pressure
F. Reduced Systolic Pressure